



QATrax Technical Guide

Rev 11/2006

Overview

QATrax is *the* premier internet-native Test Lab Management solution. Based on an advanced and very robust n-tier architecture, QATrax supports organizational structures ranging from a single lab to high-volume global operations. Users can access real-time information from anywhere in the world, across any TCP-based network (LAN or internet).

The Windows client offers some of the most flexible and advanced workflow management and scheduling features available. Users perform all activities (schedule, reschedule, view, edit, build test plans, query, etc.) using only a handful of forms.

The application server embodies the core attributes of a web server (connectionless, stateless, and scalable) while adding the benefits of providing equivalent services to both Windows and browser-based clients.

All business rules reside in a single (server-side) plug-in module allowing for revisions to be made more quickly.

TraxStar has selected Borland's Interbase as the database of choice for all of its products due to its superb design, excellent performance, minimal footprint, and extremely low maintenance requirements.

QATrax is based on the TraxStar Application Framework. Every product TraxStar builds is based upon this framework. The significant code re-use and power provided by this dynamic data-driven framework allows TraxStar to rapidly implement error free enhancements across the entire product line.

Global Architecture

Effectively manage global test lab operations

- Managers can view or manage global projects where testing is spread across several labs
- Managers can view or manage lab operations anywhere in the world
- High visibility display of resource usage in one lab or a group of labs

More efficient global test lab operations

- Scheduling and rescheduling can be handled locally or globally
- Consistent process and procedures across all labs
- User have global access; browser-like performance with native full-featured Windows functionality

One database with real-time access to all information

- Resources (people, equipment, etc.) are identified with a specific lab or may span labs
- Workflow may be specified as Global or Local, spanning labs or identified with specific lab(s)
- Projects, Work Requests and Work Orders (tests) may also span labs

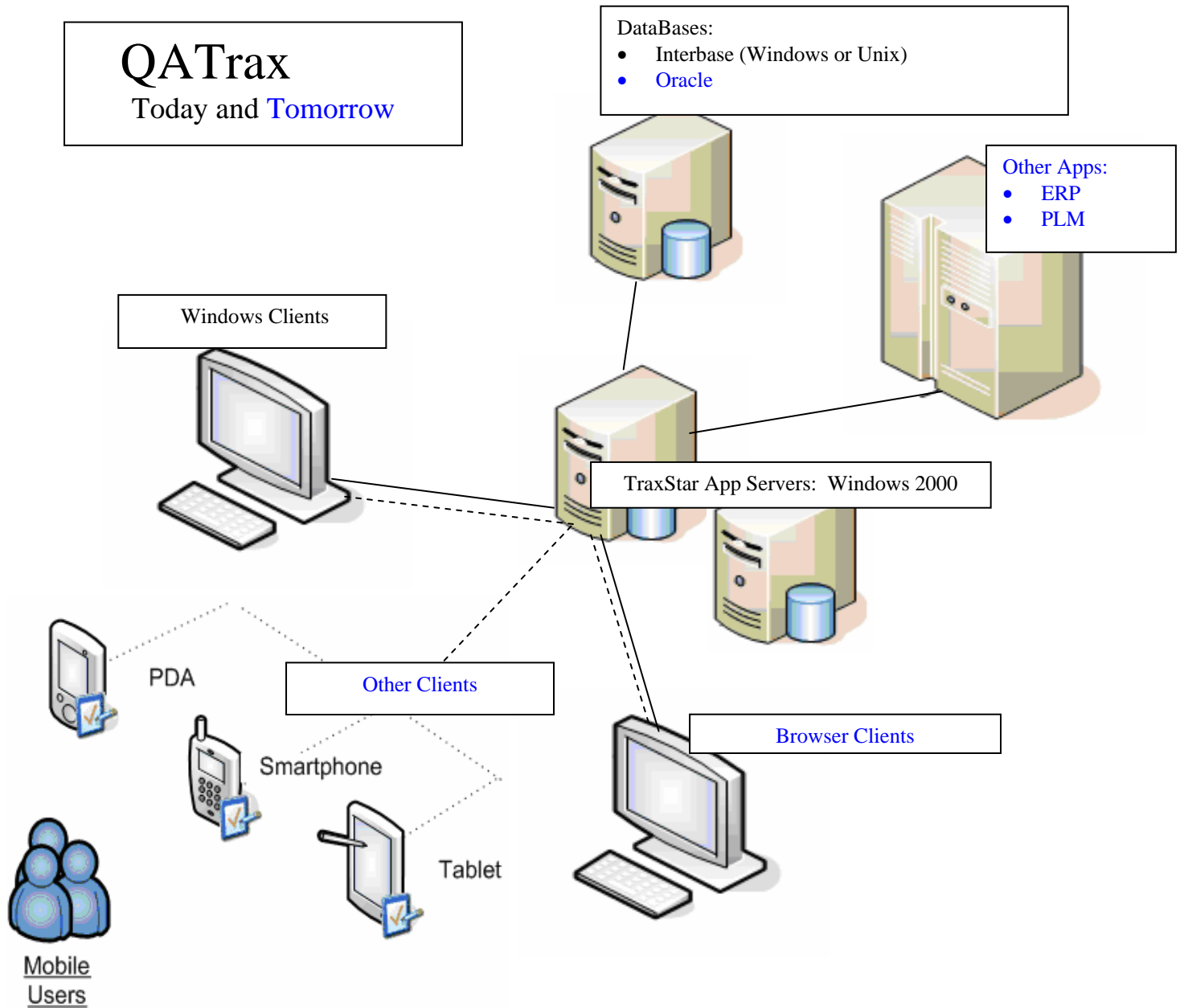
Windows clients

- IP access across the Internet or over a LAN
- Product upgrades are installed automatically
- Browser-based access in the future

What's important to know from the users' perspective

- Simple access
- Quick response
- Never worry about installing client updates

Architectural Diagram



Technical Information

A. System Software

Please outline the architectural foundation of your product.

The TraxStar Application Server (TAS) middleware, TraxStar Global Server (TGS), and Windows client are written in Delphi 7 from Borland Software Corporation. Both TAS and TGS are implemented as Windows service applications to maximize application availability and to make the most efficient utilization of available server resources.

Delphi yields native compiled code applications that run faster than applications written in Visual Basic or Java and in some cases, faster than applications written in C++. Delphi also provides an unparalleled exception handling capability yielding extremely robust and stable applications.

1. What architecture does your company employ in its product (2-tier, 3-tier)?

QATrax utilizes a true, n-tier architecture, which may be run on a wide variety of processing platforms. The client application (TraxClient) implements an interface which draws on aspects from both Internet Explorer and Windows Explorer. It runs on Windows NT/2000/XP Pro; the middle tier (TAS and TGS), manages all database access, hosts the business rules, and runs on Windows 2000/2003. The client uses TCP/IP to communicate with the server. The database (InterBase) may reside on the same server as TAS or may run on any of the supported platforms (Unix, WindowsNT/2000). In a standard configuration, TAS, TGS, and the database run on a single dedicated server. However, in larger installations, a server can be dedicated to the database and multiple servers may be utilized, each with its own copy of the TAS/TGS middleware. This configuration provides the optimum in performance and scalability by balancing the load amongst multiple dedicated middleware servers while allowing for optimal database performance using a server dedicated to the database.

Modifications, upgrades and customization of business rules are performed via a business rule plug-in hosted by TAS. Placement of all business rules in the middleware layer ensures the minimum possible resource commitment when upgrades are installed. This can represent a significant cost saving to most corporations.

The n-tier architecture utilized in QATrax also ensures the optimal use of network bandwidth, resulting in drastically reduced communication between client and middleware machines. This architecture also ensures the most efficient transfer of

data between TAS and TraxClient through the use of highly optimized data packets. These packets are assembled with the minimum possible set of information that provides the desired data view. Additional information is retrieved only as requested.

The TAS service also provides a stateless connection between the client and database. This prevents resource contention and ensures that another user never locks required data. At the same time, a consistent and complete view is always ensured.

2. How remote users would access QATrax?

QATrax does not differentiate between WAN or LAN access. The same Windows client performs well in either environment. Because QATrax employs a thin client, n-tier, stateless and connectionless architecture, bandwidth requirements are greatly minimized. Many functions are almost as fast for remote users accessing QATrax via a modem as they are for clients who are local to the server. Remote users would simply dial into a local Internet service provider (ISP), establish a Virtual Private Network (VPN), if desired, and connect to your corporate office. Direct dial-up is also supported. QATrax's low bandwidth requirements make this type of low cost connection viable.

3. Is the client portion of your product browser-based, a Java application, or a native (MS) Windows application (or combination)?

The current client application is a native Windows client. Browser-based access is currently under development.

The middleware (the application server) is stateless and connectionless. It is indifferent to whether the client is a browser or a Windows application. Because the architecture is n-tier, and the client is a "thin client", performance is maximized.

4. Is your product web-enabled or web-based?

QATrax is a web-native application, designed for the Internet, and does not require web-enabling technologies such as Citrix. Web-enabling technologies allow older architectures or architectures not intended for the Internet (due to high bandwidth requirements) to work across the Internet (e.g. passing screenshots) at the cost of an additional layer of hardware and/or software. The connectionless architecture of the client application allows for more efficient utilization of server resources and results in higher availability and scalability.

All output is created in either industry standard HTML or exported to Microsoft Excel. As a result, all reports and letters may be posted to the web or e-mailed.. Your Microsoft Outlook functionality allows the user to further tailor the output before posting to the web or sending as e-mail.

5. What configurations may the user make?

QATrax comes with many built-in tools that allow authorized users to configure portions of the program. Examples of configurations include:

- The tests and other services that a lab offers are configurable by the user. Both content and hierarchy are configurable.
- Drop-down tables are configurable.
- Test Scenarios (templates with certain info already entered) can be configured by the user
- The User Interface can be configured to individual user needs, focusing on those portions of the workflow most relevant.
- User-defined queries may be stored for private or public use.
- Queries are associated with a particular role (Work Order, Equipment Manager, Client etc...) and any time a user accesses that role, any selected query is used to filter the data. Users may define their own queries and may specify whichever query they wish to use as the default.
- A system administrator may create custom data types such as test equipment status, test inspection types, test outcomes and more. The capability to add corporate policies and user-defined help definitions, including hyperlink - both to other help topics and to Intranet and Internet sites, is provided.
- User-defined templates may be created to significantly enhance object creation and data entry speed by pre-filling any data such as test type, test method, etc. Any number of templates may be created for a given role. Further, many fields are automatically populated to logical defaults.
- External processes may be defined and launched from within QATrax.

6. Does your software employ a graphical user interface (GUI)? If so, please describe. Additionally, how long has your product contained a graphical user interface?

The QATrax client was originally designed with a GUI. The user interface utilizes the very latest notions of UI design and is based on Windows Explorer and Internet Explorer. For navigation through the database, a TreeView is shown on the left side of the screen. Other software vendors have attempted to use a similar approach but in fact, all they have succeeded in doing is representing the menu as a TreeView. This actually runs contrary to the design philosophy put forward by Microsoft and may in fact confuse users. By contrast, QATrax displays live data in the TreeView. Users select the data that they are interested in working with and the appropriate set of display/edit controls are revealed on the right hand side of the form.

QATrax also includes an intuitive calendar and Test Plan interface. Users can easily navigate their schedules and tasks to determine resource requirements. Further, the Test Plan interface allows them a global view of Work Requests.

7. What database is used?

QATrax utilizes InterBase 7.x from Borland Software Corporation for its data repository. InterBase provides the optimum balance between price, performance, portability, scalability, ease of use, maintenance and robustness. InterBase was chosen for the following reasons:

- Portability – InterBase runs on several platforms including: Windows (NT/2000/2003), Sun Solaris (7/8/9) and Linux (Red Hat/SUSE) with no database or application modifications.
- Scalability – InterBase seamlessly scales from a single user to hundreds of concurrent users. InterBase powers the Philadelphia Stock Exchange.
- Near zero maintenance: The network administrator need only confirm that scheduled automatic backups are occurring.
- Small footprint – InterBase has an extremely small footprint both on disk and in memory. This assures a minimal impact to customers existing network architectures.
- Superior multimedia support – InterBase invented Binary Large Object (BLOB) technology and has the best support for a wide range of data types including multi-dimensional arrays, video, graphics, audio and any other binary data.
- Database Administrator (DBA) not required – InterBase is self-tuning, self-optimizing and auto recovers in the case of a system failure. InterBase does not utilize transaction logs and journals as found in most other Client/Server databases. These features mean that disaster recovery does not require a DBA. In the case of a server shutdown, InterBase is able to restore itself in under a second. Where a server failure has caused a drive crash or corruption to the database, restoration from a backup can be performed by a competent Windows user in a couple of minutes using a simple GUI utility.
- Performance – InterBase uses a unique technology called Multi Generational Architecture (MGA). MGA ensures that there is never a contention for database resources (tables) by providing each user with their own snapshot view of the database within the context of their individual transactions. With this technology, readers never block writers. This ensures consistent and repeatable results during mixed mode operation where multiple users are concurrently updating and querying the database. MGA also allows automated backups to be run while users are updating the database. Within InterBase, a backup is treated the same as any other transaction and has very little impact on performance. These capabilities are unique to InterBase.
- Database shadowing – The database may be configured to run with a “Shadow.” The Shadow immediately mirrors each transaction to a second database that is a duplicate of the original database. In the case of a failure to the hard drive containing the live database, a competent Windows user can easily, within a couple of minutes, utilize the Shadow and be online with a database as fresh as the most recent complete transaction.

8. Is your database ODBC compliant and does it use native drivers?

InterBase is an ODBC compliant database. Native drivers are used for all database access performed by the middleware layer.

9. Does your system contain or interface to any E-mail system? If so, how are they linked to your product?

QATrax supports any MAPI compliant e-mail program such as Microsoft Outlook or Outlook Express. Further, all output, other than Excel Exports, is created as industry standard HTML and may be posted to the web or e-mailed.

10. What web servers does your system run on?

A web server is required for some Management Reports. Our focus has been on developing solutions which take advantage of Microsoft Internet Information Server.

11. If your product is web-enabled or web-based, what security is in place to encrypt and protect data being transferred over the Internet?

We support Virtual Private Networks with the security dependent upon the VPN encryption solution you choose.

12. What are the minimum bandwidth requirements for accessing your system via a wide area network? What are the optimum bandwidth requirements?

For a single user, an analog connection delivers acceptable performance with no feature impairment. The optimum bandwidth for each office depends on the number of concurrent users, and the type of work they are doing. For example, ten users who are doing constant data input will require more bandwidth than ten users, five of whom are doing data input and five of whom who are simply looking up phone numbers. On average, two users require 128K, six users require 256K, ten users require 512K, fifteen users require 768K and twenty-five users require 1MB. However, given the general availability of new technologies such as DSL and Cable modems, high-speed access can be achieved for a fraction of what it used to cost.

13. Can your system be expanded? Please describe in detail the scalability of your product?

QATrax's n-tier architecture, and our choice of RDBMS, is designed to be expandable.

- All three tiers can be installed standalone on a Windows 2000//2003/XP Pro workstation.

- The client can be installed on one computer and the middleware and database can be installed on a single 2000/2003 server.
- The middleware and database can be broken out onto separate servers.
- Multiple application servers running on Windows 2000/2003 servers can access a single database server. Clustering is supported.
- If a bigger database server is required, InterBase 7.x runs on the following systems (among others):
 - Microsoft:
 - OS: Windows NT/2000/2003/XP Pro
 - Hardware: Intel
 - Sun: OS Software: Solaris
 - OS: Solaris 7/8/9
 - Hardware: SPARC, UltraSPARC
 - Other:
 - OS: LINUX Red Hat/SUSE, JDBC

Further, InterBase imposes no maximum size upon the database. The size of the database is defined by the limits of the operating system.

As you can see, our product is very expandable.

14. Can your product be expanded functionally? Are there limits?

There is very little functionality that this product cannot encompass. This product was designed as a framework with a high level of code reuse to maximize the ability to add functionality with a minimum development effort and resulting in fewer bugs. Evolving web technologies, useful for data interchange using XML and platform independence using a web browser, can be readily incorporated.

15. Explain the method of importing and exporting data in and out of your system? What formats are acceptable? Can we perform these operations independently or would they require your assistance?

There are numerous ways to export data from QATrax. Much of the data is exported to Excel using a variety of date range filter. QATrax does not accept data import except during initial implementation.

16. What is the optimum number of users for your product? What is the maximum number of users?

Many variables determine the number of current users that can be supported by a single database. A single shared database/middleware server combination will support 200 concurrent users. Multiple middleware servers connected to a single database server increase this capacity to approximately 250 connections per middleware server. Again, these figures are dependent on each person's usage of the system.

17. Please describe the search engine you use?

The query engine developed by TraxStar provides capabilities not possible with conventional designs. Rather than forcing users to phrase their queries in arcane query languages such as SQL or limiting users to canned queries, users instead drag and drop their selection criteria into a panel. For each criterion, users provide constraints using edit controls and radio buttons. The query is automatically phrased for the user. Of particular interest is the ability to specify whether or not a criterion is required. This simple mechanism circumvents the need for users to deal with the complexities of set theory and its phrasing in SQL.

The query interface is useable with any data in the system. The default capabilities go far beyond those of competing products at any level and are a standard portion of QATrax. They provide users with easy, yet powerful new ways of viewing and analyzing their data. The results of any query may then be used to constrain the data.

18. How much data can be stored?

An unlimited number work orders, projects, notes, journal items, phone numbers, etc. can be stored in QATrax. Given the performance of the InterBase engine and the design of QATrax, data archiving is not necessary to maintain peak performance and is not planned.

19. Does your system allow for user-defined data types? What is the maximum allowable number of user-defined data types and are their restrictions on these fields? Are they searchable?

An unlimited number of user-defined data types may be created. These data types may be specific to a role, or may apply to all roles. As with all areas of QATrax, user defined data types are searchable.

20. Does your system require Java or Java script on the client?

No.

B. Hardware Infrastructure

QATrax utilizes a true, n-tier architecture, which may be run on a wide variety processing platforms. The Windows client application runs on either Windows NT SP6a/2000/XP Pro; the middleware, which contains all the applications business rules, runs on Windows 2000/2003; the database may reside on the same server as the middleware or may run on any of supported platforms including Windows 2000/2003, Solaris, Linux and others.

In a standard configuration, the middleware and the database run on a single dedicated Windows 2000/2003 server. However, in larger installations, a computer can be dedicated to the database and multiple Windows 2000/2003 servers may be utilized, each with its own copy of the middleware. This configuration provides the optimum in performance and scalability by balancing the load across multiple dedicated middleware servers while allowing for optimal database performance using a server dedicated to the database.

QATrax Recommendations 1

Hardware

	Database Server and Middleware ^{2,3}		Client ²	
	Minimum	Recommended	Minimum	Recommended
Processor	Pentium IV	Xeon 4	Pentium III	Pentium IV
Operating System	Windows 2000 Server	Windows 2003 Server	Windows NT 4.0 SP6	Win 2000 Win XP Pro
Memory	4 GB	8 GB ¹⁰	256 MB	512 MB
Disk Storage	40 GB ⁵	100 GB ⁵	N/A ⁶	
Network Card	100 MB			
Network Protocol	TCP/IP			

Communications

Minimum ⁷	
Users/site ⁸	Line Speed ⁹
1-2	128Kbps
3-6	256Kbps
7-10	512Kbps
11-15	768Kbps
16-25	1.0Mbps
26+	1.5Mbps

Other

- Internet connectivity on at least one computer that also runs QATrax (for support)
- 100Mbps network switch or hub (dual-speed hubs are not advised)
- Tape drive or other backup medium

1. Up to 50 users. Larger installations may require additional hardware. Better performance is realized with faster processor(s), additional memory and faster communication lines.
2. All computers/components must be certified by Microsoft to run their respective operating systems.
3. Number of concurrent clients is limited by quantity of memory, type and speed of processor(s) and number of licenses. A dedicated server is recommended for more than ten users.
4. To accommodate future growth, a multi-processor capable server is recommended, but not required.
5. 10,000 RPM or faster SCSI drives in a RAID 5 configuration is strongly recommended.
6. Less than 10MB required for application software.
7. Bandwidth above minimum will improve performance and expandability
8. Remote sites. Connection speed at server location depends on usage patterns, requiring analysis.
9. Other activity (downloading files, sending email, etc...) may impact performance.
10. Please check Motherboard and/or Operating System specs for maximum amount of supported memory, (e.g. - Windows 2000 Server Standard Edition supports 4GB, Windows Server 2003 Enterprise Edition supports 32GB).

C. Product updates

1. How are product updates handled?

All updates are handled at the server.

Clients are automatically validated upon User logon. At that time, if the server has been updated, then the clients are updated appropriately.

D. Systems Integration

1. What support does your application have for access through 3rd party software?

Third party software may be used in either of the following ways:

QATrax provides the ability to launch any Windows or DOS application supported by the operating system directly from within the application. All settings and parameters are user configurable. Secondly, QATrax will directly support any Windows OLE server compliant software and will launch that application directly from within the application. For instance, an Excel spreadsheet may be stored as an attachment to a work order. When the user double clicks on the attachment, Microsoft Excel will be launched, assuming that Excel is installed on the machine.

2. Can your database architecture be described as flexible?

Yes.

3. Is your database normalized?

Yes.

4. How do you track changes in the data? What levels of audit are provided?

Any time an Attribute (record) or Property (field) is modified for any role player in the system, the system date and time stamps the change along with the user name. Additionally, user sessions are logged. However, we do not yet support audit trails. This is a near to mid-term planned update.

5. What modifications can be made to configure the product to reflect our way of conducting business?

Configuration is principally handled in the tables. Within QATrax, custom data types, drop down tables and branch/divisional structures can be created to more accurately reflect your business structure

6. Can you provide configuration training?

Yes.

7. Do your indexing structures require maintenance?

No. Previous versions of InterBase required an occasional backup and restore to reset the index tree depth, but versions since 5.6 do not.

8. Explain how your database can accomplish replication.

Replication is unnecessary and not supported as real-time live access is simple and effective. TraxStar has thoroughly investigated replication technology and found that regardless of the replication approach, significant problems exist. As well, TraxStar has developed highly optimized data packaging and messaging technologies that provide high-speed remote access. This, coupled with the emergence of cost effective, high bandwidth connectivity (Cable, DSL, etc...) and wireless hand held devices such as the Palm Pilot, has led TraxStar to the conclusion that data replication is not a truly viable solution.

9. Can we access our information with Microsoft Excel?

Excel Export is supported in QATrax

E. Database Maintenance/Archiving

1. What amount of data (maximum number of years) may be kept on-line (not considering system storage limitations)?

Given the performance of the InterBase engine and the design of QATrax, data archiving is not necessary to maintain peak performance and is not planned. However, via saved queries (filtering data), old data can be excluded from the current view. Default saved queries can be defined by each user, and are applied each time a role is entered (e.g. open Work Orders and it automatically filters out "completed").

2. Can users view data for a particular point in time on-line?

Yes. For example, a query can be constructed to display only information created or updated within a date range.

F. Security

1. How is application security established?

A user ID and password combination controls access. This combination is defined on an individual user basis and is the same regardless of whether access is local or remote. User Name and Passwords are alpha numeric and up to 60 characters in length.

Once logged in, security is defined by User Profiles. A user, when added to the system, is assigned to one or more security profiles such as "Guest", "User", "Super User" or "System Administrator". Access to various roles (Work Orders, Clients, etc.) is constrained by these profiles. Within a profile, access to functionality such as view, edit, export, report, create, etc. is assigned on a per role basis. A user may be assigned more than one profile and the system administrator may create additional profiles to suit specific security requirements. Where a user has access to a role through two or more security profiles, the user will assume the maximum-security level allowed in the assigned profile(s).

For example, if a user is assigned additional work, that user may need access to more information in QATrax. The System Administrator only needs to assign the user a second security role. If the System Administrator modified the user's original security profile, all users with that security profile would then have the modified security rights.

QATrax currently supports View, Create, Edit, Delete, Report, Export, Print and Template access at the Role level. A future implementation will provide support down to the attribute/property level. This will allow a client to be setup as a user, and give them the ability to view information associated with their account. Perhaps the client wants to view tasks associated with a particular work order or view and edit address, phone or contact information. At the same time, the client may be precluded from viewing confidential information.

2. Is the security module available with your product function based or object based?

Principally object-based. Some functions such as printing and exporting are controlled by the security system. As well, access to objects (Work Orders, Clients, etc.) is also controlled by the security system. Access to more granular objects such as attributes and properties is not yet controlled by the security system; however, this level of security will be supported in a future release.